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...n No. 288 June, 1956

MANITOBA DEPARTMENT OF AGRICULTURE AND IMMIGRATION
WINNIPEG, MANITOBA

FEEDING THE DAIRY COW

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By Authority of Hon. R. D. Robertson, Minister of Agriculture and Immigration.
Printed by R. S. Evans, Queen's Printer for the Province of Manitoba.

FEEDING THE DAIRY COW

Profitable dairy farming depends upon the skilful combination of **breeding, feeding** and **management** to promote and sustain a high volume of milk production. To produce efficiently and economically a cow must have the inherited capacity to do so. She must be provided with a ration which fulfills her nutrient requirements, and finally she must be housed and cared for in a manner which assures comfort and quiet. These several factors are complementary and while this publication considers only the factor of feeding it must not be assumed that excellence in feeding practices will compensate for a defective heredity or negligence in management.

Components of a Satisfactory Dairy Ration

The dairy cow requires feed for the following purposes:

1. Maintenance of the body,
2. Production of milk,
3. Growth, if the cow is immature,
4. Growth and development of the unborn calf and
5. Gain in weight when the cow is too thin.

To fulfill these needs a satisfactory ration must be made up of feeds which will supply as many of the following qualities as possible:

PALATABILITY—The palatability of a ration directly affects the amount of feed consumed. If the ration is unpalatable a cow may not consume sufficient quantities to support the optimum levels of production and physical condition. Appetizing qualities can be improved by feeding of hays that are bright green in color and not overly coarse. Silage should be free from spoilage; grain mixtures should not contain dust, moulds or foreign substances. To stimulate increased consumption of otherwise unpalatable feed, beet molasses may be diluted with two parts of water and poured lightly over the feed, usually a roughage.

SUCCULENCE—Feeds with a high water content and the natural juices of green forages are considered to be succulent. Cows tend to consume more feed when the ration contains such succulent feeds as silage, soiling crops or green grasses.

BULK—A feed which occupies a relatively large volume of space and is light in weight is said to be bulky. Bulk is necessary in a dairy ration to promote both efficient digestion and a slightly laxative effect. Lack of bulk is a common cause for cows going-off feed. Examples of bulky feeds are wheat bran, beet pulp and dried brewers grains. Of the cereals, oats may be considered bulky, whereas wheat is not; an excessive level of wheat in a grain mixture can lead to digestive disorders. Coarse grinding of grains helps to assure bulkiness.

VARIETY—Variety in a ration tends to aid in palatability and to assure that the nutrient requirements of the cow are fulfilled. Sufficient variety may be provided by including two kinds of roughage, i.e., hay and

silage, and by using two or more grains together with several sources of protein supplement in the grain mixture.

CHEAPNESS—The cost of a ration is an important factor. Fortunately most of the ingredients of a ration which meet the above essentials and satisfy nutrient requirements can be provided by farm-grown grains and roughages. Purchases of mineral and protein supplements are, however, necessary to balance farm-grown feeds. Cheapness is not enough in itself to commend a particular ration; it is false economy to feed a cow a low cost ration if it deprives her of needed nutrients. Good quality feeds are a necessity if optimum milk yield and hence profitability is to result.

BALANCE OF NUTRIENTS—In addition to satisfying these general requirements, an adequate ration is expected to supply the specific nutritional substances required for maintenance, growth, reproduction and lactation.

Protein—The amount of protein required by the dairy cow depends primarily on her weight and the volume of milk that she is producing. The cheapest sources of protein are high quality legume roughages; these can supply a large portion of the cow's requirements. Including in the grain mixture such high-protein feeds as linseed oil meal amply compensates for a deficiency in the roughage.

Carbohydrates—Carbohydrates, consisting mainly of starches and sugars, make up the major part of the ration of dairy cows. They provide both heat and energy. Roughages are relatively low in carbohydrates and must be supplemented by cereal grains and mill products, the primary sources of this feed substance. Milk production is a heavy drain upon the carbohydrate consumed in the feed. All too frequently low milk yields are the result of failing to make available sufficient energy producing feeds.

Vitamins—Of the many known vitamins, only vitamins A and D need be mentioned. Other vitamins are either synthesized in the rumen or occur in sufficiently high quantities in typical rations that they need be of little concern.

Vitamin A is essential for growth, reproduction and the prevention of diseases of the respiratory and digestive systems. The original source of the vitamin is carotene, a pigment found in the green leaves of pasture and hay crops; well preserved silage retains a high proportion of the carotene of the forage crop. "Brown" pasture or hay exposed to sun, rain and weathering, loses part of its vitamin A potency. Fortunately, cows have the ability to store a good reserve of the vitamin during the lush pasture season and deficiencies are likely only after prolonged periods of consuming old, colorless hay. Providing green leafy hay during the winter season is the best answer to a possible deficiency. If this is not possible, the adding of a commercial vitamin A supplement to the grain mixture may be necessary.

Vitamin D is required for the absorption and use of the minerals, calcium and phosphorus. It is important during pregnancy for bone

development of the unborn calf and during lactation because milk contains comparatively large amounts of the two minerals. Dairy cows usually receive their vitamin D from sun-cured hay as well as exposure to sunshine. Only after a lengthy period of indoor confinement is a deficiency likely to arise. Under those circumstances feeding of well sun-cured hay will prevent any probable lack of vitamin D.

Minerals—Rations containing the usual variety of feeds are likely to be deficient in only five minerals; i.e. common salt, iodine, calcium (lime), phosphorus and cobalt. Deficiencies of calcium and phosphorus are overcome by supplemental feeding of bonemeal or monocalcium phosphate. The need for cobalt, iodine and salt can be supplied by iodized cobalt (blue) salt. Two methods of feeding minerals are recommended. Cows on pasture or otherwise outside should have ready access to a mineral box containing two parts of feeding bonemeal and one part iodized cobalt salt. In addition, grain mixtures in summer and winter should include bonemeal and salt each at the level of one and one-half percent.

Special care should be taken to ensure cows of an adequate level of minerals, especially calcium and phosphorus, during the latter stages of a lactation period and the subsequent dry period. During these stages cows store a reserve of calcium and phosphorus for the succeeding lactation.

Water—Cows in milk require four to five pounds of water for each pound of milk produced. On the average 12 to 15 gallons should be provided each cow per day. Ideally, cows should have constant access to water but if this is not feasible watering at least twice daily is recommended. The optimum temperature appears to be about 45°F.

Feeding During the Pasture Season

Good legume or grass-legume pastures are usually the most economical sources of feed for milking cows. Fresh green forages furnish large amounts of proteins, vitamins and carbohydrates at low cost. However, the nutritive value of pastures declines with advancing maturity of the forage crop. To lengthen the grazing season the use is advised of supplementary pastures which reach the optimum grazing condition as permanent pastures ripen. Rotational grazing may provide the same effect.

A cow has the capacity to consume sufficient excellent quality forage to supply her maintenance requirements and the production of approximately 25 pounds of milk. A higher level of production requires additional feeding of a grain mixture.

The composition of a grain mixture is dependent upon the quality of the pasture. Pastures may be broadly classified as excellent, good or fair depending upon such factors as species of forage and the stage and density of growth. Generally the quality tends to decrease gradually during the course of the pasture season. To compensate for this progressive reduction in quality increasingly larger proportions of protein-rich feeds may be incorporated into the grain mixture.

Following are suggested suitable grain mixtures based on the quality of the pasture.

	Excellent Pasture		Good Pasture		Fair Pasture	
	Table 1 lbs.	Table 2 lbs.	Table 3 lbs.	Table 4 lbs.	Table 5 lbs.	Table 6 lbs.
Wheat . . .	—	—	—	200	—	—
Oats	650	800	650	760	725	580
Barley . . .	350	150	190	—	—	170
Bran	—	50	160	—	100	100
Linseed Oil Meal	—	—	—	40	175	—
Soybean Oil Meal	—	—	—	—	—	150

The amounts of the grain mixture to be fed to cows is determined by the milk flow, butterfat test, condition of the cows and quality of the pasture. To utilize feed efficiently and economically a knowledge of the individual cow's production and butterfat test is essential. Otherwise a cow may be overfed or underfed, either situation resulting in less than the most profitable level of feeding.

Approximate guides as to amounts for cows in **good condition** on **good pasture** are presented in the Grain Feeding Chart No. 1. To allow for varying quality of pasture it is recommended that cows on "fair pasture" be provided with three additional pounds to the amounts specified; if "excellent pasture", the amounts may be reduced three pounds.

GRAIN FEEDING CHART No. I

Cows on Good Pasture

Daily Milk Production	Pounds Grain Mixture Required Daily According to Butterfat Test				
	3.5% lbs.	4% lbs.	4.5% lbs.	5% lbs.	5.5% lbs.
15	—	—	1.0	1.0	2.0
20	2.0	2.5	3.5	4.0	4.5
25	3.5	4.0	5.5	6.0	7.5
30	5.0	6.0	8.0	8.5	10.0
35	7.5	8.5	10.5	11.0	12.5
40	9.0	10.0	12.5	13.5	15.5
45	11.5	12.5	15.0	16.0	18.0
50	13.0	14.5	17.0	18.5	20.5
55	14.5	17.0	19.5	21.0	23.5
60	16.0	19.5	22.0	23.0	23.5

The above levels are based on the requirements of mature cows. Milking heifers should receive, daily, an additional two to four pounds to provide for normal growth.

Winter Feeding Practices

Successful and economical winter feeding results from imitating as nearly as possible the early summer conditions; combining good quality legume or grass legume hays with silage produces a roughage ration comparable to a pasture crop both in nutrient content and succulence.

Dairy cows will normally consume from two to two and a half pounds of hay daily per hundred pounds live weight. If hay is to be replaced partially by silage, three pounds of silage are approximately equivalent to one pound of hay. While silage may be fed as the sole source of roughage, it is preferable to feed at least one pound of hay daily per hundred pounds live weight. It is good feeding practice to supply dairy cows with all the good quality roughage they will consume without waste and then supply, if needed, a suitable grain mixture.

Satisfactory grain mixtures will vary in composition according to the quality of the roughage. Stage of cutting, storage conditions and many other factors may markedly affect the feeding quality of both silage and hay. Despite these limitations roughages may be most easily classified by the proportion of legumes present. Other factors being equal the legume content is an accurate gauge of roughage quality.

Following are examples of grain mixtures to be fed with roughages, either hay or silage, which vary in quality as determined by legume content.

	All Legume Roughage		Hay Legume Half Grass		All Grass Roughage	
	Tab. 7 lbs.	Tab. 8 lbs.	Tab. 9 lbs.	Tab. 10 lbs.	Tab. 11 lbs.	Tab. 12 lbs.
Oats	450	500	500	400	475	400
Barley . . .	300	200	200	300	175	275
Wheat . . .	—	—	100	—	130	—
Bran	100	200	—	100	—	100
Linseed Oil Meal	150	—	—	200	—	225
Soybean Oil Meal	—	100	200	—	220	—

Many dairymen prefer to purchase commercial dairy supplements containing approximately 32% protein. Mixing the supplements with farm grains, mainly oats and barley, will produce a good quality grain mixture. The amount of 32% dairy concentrate to incorporate into one-half ton of feed will vary from 200 to 350 pounds depending on the quality of the roughage.

Recommended daily allowances of a grain mixture for stable fed cows are presented in Grain Feeding Chart No. 2. The amounts indicated are suitable for cows fed good quality hay and silage at the typical rate of two pounds of hay or hay equivalent per 100 lbs. of live weight.

GRAIN FEEDING CHART No. II

Grain Requirements for Stable Fed Cows

Daily Milk Production	Pounds of Grain Mixture Required Daily According to Butterfat Test				
lbs.	3.5% lbs.	4% lbs.	4.5% lbs.	5% lbs.	5.5% lbs.
15	2.5	3.0	4.0	4.5	5.5
20	4.5	5.0	6.5	7.5	8.5
25	6.5	7.5	9.0	10.0	11.5
30	8.5	9.5	11.0	12.0	13.5
35	10.0	11.5	13.0	14.5	16.0
40	12.5	13.5	16.0	17.0	19.0
45	14.5	16.0	18.5	20.0	22.0
50	16.5	18.0	20.5	22.0	23.0*
55	18.5	20.0	22.5	23.0*	23.0*
60	20.5	22.5	23.0*	23.0*	23.0*

*23 pounds per day is approximately the maximum to be fed safely.

NOTE: Add two to four pounds daily for milking heifers.

FEEDING THE DRY COW—Dry cows should be well fed with dry roughage, silage or pasture forming the basis of the ration. In addition a minimum of about four pounds of grain daily is recommended for cows in thrifty condition. Thin cows may require up to ten pounds. Enabling cows to gain a good degree of "fleshing" during the dry period will pay dividends in milk production during the subsequent lactation period. Heavy feeding after calving seldom compensates for an inadequate ration during the "dry" period.

A grain mixture containing two parts of oats and one part barley is satisfactory for dry cows unless the quality of the roughage or pasture is below average. Including small amounts of bran and linseed oil meal will allow for deficiencies in the forage. As mentioned previously special provision should be made for mineral supplements during the dry period. The foregoing suggestions are also applicable to springing heifers in the last two months of gestation.

During the week preceding calving cows should be fed a laxative and "cooling" grain mixture. A suggested mixture includes two parts oats, one part linseed oil meal and one part bran. The amount need not exceed four to five pounds daily.

Feeding During the First Month of Lactation

Immediately after calving, the feeding of a warm bran mash is advisable. During the first three or four days of production a cow may be provided with the pre-calving grain ration at a level of approximately five pounds a day. Following this period a cow in good condition can gradually be given the regular herd ration as quickly as her condition will permit. Care must be exercised, however, in increasing a cow's ration to full feed. Beginning at a level of about five pounds of the grain ration at the fifth day after freshening the amount may be increased at the rate of one pound every two or three days until maximum milk production is reached at about the fourth week. Increasing the level of grain feeding either too quickly or too slowly may lead to a temporary setback or to failure to attain peak production.